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ABSTRACT

This paper presents an economic model of the relationship between time allocated to learning activities at home and achievement in school. The model is contrasted to four alternative models of the home-school relationship. Data from a 1975 survey of the parents of 887 elementary school children from one New York State school district are used to examine the relationship between 36 measures of family behavior and characteristics to student performance on standardized math and reading tests. Independent variables are organized into six groups representing socioeconomic status, family structure, maternal availability and education, parental expectations, after-school time use and parent-child interactions. Controlling for parental expectations, home time use and parent-child interactions, differences in family socioeconomic status, family structure (e.g., birth order and siblings) and maternal employment add little or nothing to predictions of school achievement. The analysis strongly suggests that it is differences in what families do rather than differences in their characteristics or incomes that affects school achievement. (Author)

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Time Allocation At Home and Achievement in School

Victor Levine

This paper presents an economic model of the relationship between time allocated to learning activities at home and achievement in school. The model is contrasted to four alternative models of the home-school relationship. Data from a 1975 survey of the parents of 887 elementary school children from one New York State school district are used to examine the relationship between 36 measures of family behavior and charateristics to student performance on standardized math and reading tests. Independent variables are organized into six groups representing socioeconomic status, family structure, maternal availability and education, parental expectations, after-school time use and parent-child interactions. Controlling for parental expectations, home time use and parent-child interactions, differences in family socioeconomic status, family structure (e.g., birth order and siblings) and maternal employment add little or nothing to predictions of school achievement. The analysis strongly suggests that it is differences in what families do rather than differences in their characteristics or incomes that affects school achievement.

Introduction

One of the most robust findings of educational input-output research is that family characteristics are powerful predictors of achievement in school. While researchers find that parental characteristics such as education, income and occupational status are positively related to outcomes in virtually all studies of achievement, the mechanisms through which advantage is transmitted are not well understood. Children from advantaged households enter school with more cognitive skills than their peers and differences increase, on average, throughout the school experience. Apparently, substantial educational production occurs at home both prior to school entry and during nonschool hours. Although research in this area is limited, it is likely that the nature and extent of child-parent interactions is a key to this phenomenon, particularly for young children.

From birth to the completion of high school, children spend about 15 percent of their (approximately 100,000) waking hours in the classroom. While substantial research has focused on how time-use in the classroom affects learning, relatively little is known about how the remaining 85,000 hours are spent or about how differences in this out-of-school experience affect achievement. The substantial body of survey research data collected during the past two decades contributes relatively little to understanding this process. Data on nonschool activities have been restricted in a number of important ways:

> Frequently, researchers are not interested in the effects of family variables per se. Instead, they simply want to control for them .... Hence, they may show less care in the selection and measurement .... they often seize on readily available measures . . . without careful consideration of how they relate theoretically to . . . outcomes.
>
> (Bridge, Judd & Moock, 1979, p. 215).

Moreover, there is no consensus on the appropriate theoretical framework for collecting and analyzing such data. Walberg and Marjoribanks (1976) posit twelve analytic models for research on the impact of family environment on cognitive development. In a recent review of literature, Iverson and Walbert (1982) synthesize data from 18 major studies and identify four "schools" of research: the socioeconomic school, the "family constellation school" (emphasizing birth order, family size, etc.), the "British School" (emphasizing parental expectations and attitudes), and the "Chicago School" (emphasizing family behavior and parent-child interactions). Other theorists have suggested that, given the prevalence of neighborhood schools, family effects may operate indirectly through peers, teacher expectations or general neighborhood climate (Benson, Medrich and Buckley, 1980). While there are substantial data on parent-child interactions at home (Henderson, 1981), the links to school performance are not clear. Some suggest that differences may be related to sociolinguistic factors (Wilkinson and Calculator, 1982) or to congruence between family and institutional cognitive styles (Laosa, 1982). The problem is that most studies of school achievement employ what Bronfenbrenner (in press) calls "social addresses" rather than measures of children's actual experiences away from school.

Despite these theoretical uncertainties, the literature on family impacts is quite extensive. In addition to the substantial body of "input-output" studies that include home variables (see Averich et al., 1974 and Bridge, Judd and Moock, 1979 for reviews), there have been a number of extensive reviews of the home environment/school achievement literature. Iverson and Walberg (1982) provide an overview and synthesis of 18 major studies in this area. One area that has attracted a great deal of attention is the impact of family structure and maternal employment on children, (Bronfrenbrenner and Crouter, 1981; Crouter, Belsky and Spanier, in press; Heyns, 1982; Hoffman, 1980; Smith, 1981). There is little evidence that maternal employment

adversely affects school outcomes yet, despite the substantial literature in this area, no unambiguous conclusions emerge. As Hoffman (1980, p. 320) notes "the data are very limited. There is in fact no study that has properly investigated the connection between maternal employment and the child's academic attitudes or cognitive functioning and abilities."

One avenue of research on the family-school relationship utilizes the economic model of time allocation. Building upon Gary Becker's seminal work of 1964, "A Theory of the Allocation of Time," economists have posited a model in which households "produce" desired commodities at home by combining purchased inputs with household members' own time. Individual family members allocate their time between market work and household production depending upon family income and preferences and each member's productivity in alternative activities. The home production of human capital in children is particularly time-intensive, requiring substantial adult inputs as well as, the often neglected, time of children. All else equal, parents and children who are more productive in producing human capital would tend to allocate more time to this activity. (See Becker, 1964; Becker and Tomes, 1976; Benson, 1980; and Michael and Becker, 1973 for a discussion of the model). However, since the factors that increase productivity in creating human capital are likely to increase productivity generally, the opportunity cost of time spent with children is probably higher for more educated parents. An hour of such parent's time would consequently represent a greater investment in the child's human capital.

From this perspective, home inputs to children could differ in any of three ways. First, children might get more or fewer hours of total parental time devoted to developing their human capital. During any specific hour spent with a parent, the parent might be more or less productive depending upon his or her own education and abilities. Finally, hourly productivity could vary depending upon how the parent and

child were engaged. For example, Leibowitz observes that "time spent reading to a child is probably higher quality time than time spent watching TV with him" (1977, p. 245). She distinguishes differences in hourly productivity that are due to inherent parental characteristics (the "worker effect") from those caused by parental selection of activities with greater learning content (the "allocative effect").

Substantial data exist on the way Americans spend time (Robinson, 1977; Virginia Polytechnic Institute, 1981; Walker and Woods, 1976). In general, more educated women provide more time to market activity; however, data from the 1960s indicate that "in spite of their greater price of time . . . more-educated mothers spend more time in child care, both overall and per child" (Leibowitz, 1974, p. 244). See Benson (1980) for a review of time budget studies.

While data on adult time use are relatively abundant, information on the way children use time is less plentiful. In 1976, Child Trends Inc. conducted interviews with parents and elementary school children in a national probability sample of 1,700 families (Zill and Brim, 1978). A subset of these families was reinterviewed in 1981. Data were collected on a wide range of time use activities by children. In 1975, the Childhood and Government Project, University of California, Berkeley, interviewed 764 Oakland, California families (Medrich, et al., 1982). Both sets of data included information on school outcomes. Aside from these two studies, little data on how children use time and the relation of time use to school outcomes exist. "Children are infrequently the subjects of time research" (Medrich et al, 1982, p. 22). Given that family characteristics and school outcomes are so strongly related, "there is surprisingly little written about the things that parents and children actually do together" (Medrich et al, 1982, p. 10). In light of the substantial interest that has been paid to time allocation in the classroom time-use at home certainly warrants additional attention.

The limited data available on home activities and school achievement is inconclusive. In a study of three and five year olds, Leibowitz (1977) found that verbal performance was negatively related to family size and positively related to mother's education. When variables measuring specific parent-child activities were added to the regression equation, the coefficient on mother's education decreased in size and was no longer statistically significant. Benson, Medrich and Buckley (1980) in an analysis of the Oakland data described above, found that while specific parent-child activities were related to achievement, the relationships diminished or disappeared when measures of family SES were controlled for. The issue of why family characteristics are related to school outcomes and which are most important is far from being resolved. Our objective in this study is to report findings from a new data source and, in particular, to compare the relative explanatory power of different kinds of family variables.

The Data

In the spring of 1975, a ten-page questionnaire was sent to the mothers of 1,400 elementary school children in a district of Westchester County, NY. Information was requested on parental occupations, work experience, earnings, work history, family composition, parental attitudes and expectations as well as after-school time use and parent-child interactions. These data were collected by an interdisciplinary team at Teachers College, Columbia University for use in a number of related studies (Crawford, 1977; Levine, 1980; Levine and Moock, 1983). The school district was selected because it offered parental choice among a variety of instructional alternatives, an area of interest in one of the studies (Bridge and Blackman, 1977). A total of 2,383 students were enrolled in elementary grades in the system at the time of the survey. Students in nontraditional instructional programs were oversampled; in

families where more than one sibling was selected for the sample, all but one was randomly excluded. Of the initial mailing of 1,400, 900 questionnaires were returned (about two-thirds). Of these, 887 contained usable information.

Outcome Measures

Cognitive Achievement

The Metropolitan Achievement Test (MAT) mathematical computation (MATH) and reading (READ) scales were administered to all students in the district in May 1976. Scores were collected from elementary school records and converted from grade equivalents to standardized scores by the research team. These scores and student ID numbers were transcribed by hand at school sites and some transcription errors were, in all probability, introduced during the process. In all regression analyses that follow, achievement data are entered as standardized scores. Of the 887 students for whom questionnaire data were available, achievement data could be matched to family records for 646 cases. The matching was done on the basis of a student identification number appended to each questionnaire. In some cases, this ID number was removed by parents, precluding matching. In some cases, the identification number may have been incorrectly transcribed during the collection of achievement data. Most of the sample attrition was due, however, to the graduation of approximately one-sixth of the sample (sixth graders in spring 1975) out of the elementary school system, prior to administration of these texts.

Noncognitive Measures

In addition to the standardized achievement tests, the district psychologist developed and administered three ten-item scales designed to measure students' self-concept (SELFCONC), attitudes toward school (ATTISCHL) and perceived locus of

control (LOCCONTR). Unlike the MAT, these noncognitive tests were administered selectively and scores were available for about only 55 percent of the elementary students in the system. These noncognitive scores could be matched to questionnaire records in only 338 instances. Since these scales were unique to the school district and were not nationally-normed, they are of only secondary interest in this study.

Selection and/or Response Bias

Students for whom questionnaire and outcome data were available did better, on average, than other students on all five tests. These differences were statistically significant at the .01 level on both MAT scales. Of course, given the unusual sampling plan, we cannot tell whether these differences are a function of the sample itself, or self-selection in questionnaire response.

Independent Variables

Questionnaire responses were used to construct 36 measures of home environment which we believed might be related to school achievement. While this wide range of home measures provided a basis for examining the relative importance of different home characteristics on school outcomes, home measures were highly colinear, increasing the danger of nonstable estimates. Our approach to this problem was to organize the 36 family variables into six groups representing six dimensions of home environment. Within each group, we first regressed each of the five outcome measures on multiple measures of (what we hypothesize to be) the same construct, controlling for grade and sex. Conducting analyses separately by groups provides an opportunity to compare the relative explanatory power of alternative measures. Variables in each group are entered stepwise into an OLS regression using significance at the .10 level as the criterion for inclusion.

In a second round of analysis, only those variables retained in the initial regressions are included in a set of five general predictive equations. This approach allowed us to compare the contribution of the "best" variables from each of the six groups. In particular, we were interested in whether the commonly observed relationship between family socioeconomic status and achievement would persist once differences in time-use and parent-child interactions were controlled for.

Grade and Sex

By construction, MAT standardized scores provide a continuous scale that can be used across grades. Since our sample included students from five different grades (2 through 6), we obviously needed to control for grade as a student, rather than a family, characteristic. In many studies of elementary achievement girls score higher on achievement tests than boys. Of course, gender-related differences may be a function of parental behavior at home. Girls may simply be socialized differently than boys. In this paper we have treated both grade and sex as "student" characteristics to be included as controls in the achievement regressions.

Table 1 shows the means and standard deviations of each of the five outcome variables by grade and sex. As we would expect, scores on the two MAT achievement scales increase monotonically by grade. Two of the noncognitive scales (SELFCONF and LOCCONTR) also appear to be positively related to grade. This might simply reflect changes associated with maturation. Scores on the ATTISCHL scale are essentially U-shaped, reaching the lowest level in Grade 4. Differences by grade on the two achievement tests are statistically significant at the .01 level and tests for curvilinearity indicate that the grade-score relationship is nonlinear on both READ and MATH. In the analyses that follow, GRADE is entered as a single continuous variable in the three noncognitive regressions and as a set of four dichotomous variables in the

achievement models. As was anticipated, girls scored higher than boys, on average, on all five measures. Differences were statistically significant, however, only on the variable ATTISCHL.

Six Groups of Family Variables

Socioeconomic Status (SES) - Group I

The family construct most regularly associated with high school achievement is socioeconomic status. Four measures of SES were constructed from the questionnaire data. First, respondents were asked to indicate family income by selecting one of nine categories. These responses were used to construct a continuous family income measure (FAMINC) using the mean of each interior category and the boundaries of the two end (open) intervals. The educational attainment of husbands in the sample (HDEDUC) was used as a measure of SES. Respondents were asked to describe their husband's current or most recent occupation. These responses were coded into 10 occupational status categories (0-9) forming the third SES variable, HDOCC. Finally, based on information on husband's wages and hours worked, a measure of the husband's hourly wage rate (HDWAGE) was constructed.

Means and standard deviations on these four SES variables are provided in the first column of Table 2. By any of these measures, families in this sample represent the upper tail of the socioeconomic distribution. Mean annual family income (in 1975 dollars) was almost $34,000. The average education level for men in this sample was 15.6 years and the education estimate is biased downward by the survey instrument. The education questions (for husbands and wives) provided 12 categories in which the highest cell represented "more than 16 years of school." Over half the responses for husbands were in this highest cell. Inspection of the occupational distribution (over 20 percent doctors, lawyers, judges or university professors) indicated that the upper end

of the education distribution was truncated. Responses in the highest education category were treated as 17 years of schooling in the analyses presented below.

When the five outcome measures were regressed on these four SES measures (together with grade and sex variables), SES was statistically significant in only the achievement equations. Both educational level and occupational status were significantly related to READ at the .05 level. Neither the income nor the wage variables entered the equation. In the MAT equation, only husband's education was significant.

Family Structure - Group 2

Six variables reflecting family structure and religion were included in the second group. Means and standard deviations on these six are shown in Table 3. Respondents were asked to fill in the body of a table showing the ages and school status of all children in the family. From these responses, three variables reflecting the presence of children were constructed. On average, families in this sample had 2.99 children (NCHILDREN). Of these, 0.32 were preschool age (NPRESCHOOL) and 2.41 were in school (NINSCHOOL); the remainder had completed school. Slightly less than ten percent of the respondents indicated that no husband resided with the family (NO FATHER). Two dichotomous variables reflecting religion were included in this group on the assumption that religion would be related to family size and incidence of divorce. About one-third of the sample reported being Jewish and almost 40 percent were Catholic. The excluded category was predominantly Protestant.

Of the three measures of children present in the home, NPRESCHOOL was the only significant variable. It had a positive and significant coefficient in both achievement equations, and a positive (though not significant) sign in all three noncognitive models. Neither total number of children in the family (NCHILDREN)

nor number of school children (NINSCHOOL) was significant. The analysis suggests that having younger sibling is positively related to achievement in school. In all five equations the coefficient on JEWISH was positive and the coefficient on CATHOLIC was negative. The variable JEWISH was statistically significant in both MAT regressions; CATHOLIC was significant in the READ model and as a predictor of ATTISCHL. Finally, the variable indicating no father had a negative sign in all five equations and was statistically significant in both the achievement equations as well as in predicting ATTISCHL. Controlling for grade and family structure, the coefficient on FEMALE was positive in all five equations and was significant in the READ and ATTISCHL equations.

Mother's Characteristics - Group 3

Because most child care activities are conducted by mothers, it is reasonable to expect mothers' characteristics to be strongly related to outcomes. Questionnaire responses were used to construct six measures of the mother's productivity and availability. Means and standard deviations on these variables are shown in Table 4. The variable measuring mothers' education (WFEDUC), occupational status (WFOCC) and hourly wage (WFWAGE) were constructed from questions comparable to those described for the men. In addition, a dichotomous variable (WFTEACH) was coded as 1.0 for the ten percent of the sample that reported having been employed as school teachers. Two additional variables were constructed to reflect availability at home. The dummy variable WWORK was coded 1.0 for those respondents who reported working full or part time in 1975. Respondents were also asked to indicate the number of hours of market work they had engaged in during each of the sample child's preschool years. The total number of hours worked during this interval (PREHOURS) was entered as a measure of availability during the preschool period.

The variable WFEDUC was statistically significant in both achievement equations as well as in the LOCCONTR regression. It also displayed a positive sign in the remaining noncognitive outcome models. Occupational status was positively associated with reading achievement, but working in the current period appeared to be negatively associated with reading achievement. The wife's hourly wage rate had a positive sign in all five equations but was statistically significant only as a predictor of attitude toward school. Finally, labor supply during the preschool interval was negatively associated with both attitude toward school and perceived locus of control. In general, wives' education appeared to be the strongest predictor of school outcomes in this group of variables.

Parental Attitudes and Expectations - Group 4

Respondents were asked to indicate the number of years of education that they would "like this child to complete" (EDASP) as well as the level of schooling they thought the child would actually complete (EDEXP). Table 5 shows the mean response on these two variables and their impact on each of the five outcome measures controlling for grade and gender. Both aspirations and expectations were quite high, exceeding the completion of college. The coefficient on the expectation variables was positive in all five equations and significant in four out of the five. Controlling for expectations, aspirations do not have a significant independent impact on predicting outcomes in any of the five areas. The correlation between EDASP and EDEXP is quite high (r=.76), as one might expect. Controlling for educational expectations, the coefficient on FEMALE is positive and significant in both MAT equations.

Time Use - Group 5

Our central interest in this paper is how nonschool [illegible]e-use and activities affect achievement. Information on time use was collected by asking parents to indicate the amount of time that the child spent in each of five specific activities "before going to bed on a normal day." In addition, space was provided for parents to list additional activities that were not included among the five on the questionnaire. On average, parents reported six and one half hours of after-school activity on a normal day. Means and standard deviations on each activity variable are shown in Table 6. The activity that accounted for the greatest amount of after school time was playing with other children (CHILDREN). This was followed by time spent watching television (TV) and "doing things with adults" (ADULTS). It was reported that children spent about three-quarters of an hour playing alone (ALONE), and about two-thirds of an hour per night on homework (HOMEWORK). In coding responses to the open questionnaire time use items, the two most frequently mentioned alternative uses of time were organized activities (ORG ACTV) and household chores (CHORE).

We had anticipated that time spent in specific after school activities would be strongly related to outcomes. In particular, it was thought that time spent doing homework and interacting with adults would have a positive impact while time spent playing (alone and with other children) and watching television might have an adverse effect.

As we anticipated, television time was negatively related to both READ and MATH and, while not statistically significant, the coefficient on TV was negative in two of the three noncognitive equations. Time spent playing with other children appeared to be unrelated to the outcome measures but time spent alone was positively related to both achievement measures. Most surprising of all, the two activities (ADULTS and HOMEWORK) were negatively associated with outcomes. Time spent

with adults was negative and statistically significant in both MAT achievement equations. Homework time was negatively associated with READ and LOCCONTR. The analysis of the relationship of time use to achievement, while supporting the hypothesis that the way of out-of-school time is used affects outcomes, produced surprising results in terms of the impact of specific activities.

Parent-Child Interactions - Group 6

In addition to time use, we felt that the incidence of specific parent-child interactions might be important in explaining school achievement. A set of ten dichotomous activity variables was constructed from the questionnaire data; means and standard deviations are shown in Table 7. Respondents were asked to report the frequency with which a family member read to the sample child prior to entering school. Over half the sample reported that the child was read to every day (READPAST). READPAST was the only retrospective variable used; the other nine activity variables referred to parent-child interactions at the time of the survey. Parents were asked to indicate where the sample child typically ate dinner. In those families where the child was reported to eat with adults, the variable EATWITH was coded as 1.0. The remaining eight variables were constructed from responses to a set of questions in which mothers were asked to indicate the activities that the mother and child did together on a regular basis, at least once a week. Five of these were coded from closed categories on the questionnnaire: Reading books or magazines together (READNOW); playing games or doing puzzles (GAMES); doing household chores (CHORES); going shopping (SHOP); and, going out together to recreational activities (RECREA). Three additional variables were constructed from responses to open-ended questions. The variable RELIGN was coded as 1.0 if the parent reported going to church or praying together with the child at least once a week. If creative or

cultural activities (e.g., music, painting, singing, crafts) were listed, the variable MUSART was coded as 1.0. Finally, if mothers listed "talking together" or "joking together" of similar verbal interaction as an additional activity, the variable VBLINT was coded as 1.0.

As we expected, having read to the child on a daily basis during the preschool years (READPAST) was positively related to achievement. This variable also had a positive coefficient in all three noncognitive regressions and was statistically significant in two of the three questions. Eating together in the current period (EATWITH) was also strongly related to achievement but, contrary to our expectations, the relationship was negative in all five equations and was statistically significant for both READ and MATH. Of the remaining activity variables, verbal interaction (VBLINT) was positively related to reading achievement while shopping together (SHOP) was negatively associated with the outcome. In the MATH model, religious activities (RELIGN) had a negative coefficient. Of the three noncognitive outcome measures, only attitude toward school (ATTISCHL) was significantly related to the activity variables (controlling for grade and sex). Reading and doing chores together were positively associated with attitude while verbal interaction had a negative coefficient.

Step 2 - General Achievement Model

In the second step of the analysis, each of the five outcome measures was regressed on only those independent variables that had been statistically significant in the first analysis step. This reduced the number of independent variables (measuring family characteristics and activities) from the initial set of 36 to fewer than 20. From 1 to 19 family variables were retained depending upon the outcome measure used. The results of these regressions are shown in Table 8. In addition to the grade and sex

variables, a total of 23 family variables appeared in at least one regression. When an independent variable was excluded from a particular regression (due to elimination in the first step), its exclusion is indicated by three dashes in the body of the table. For those variables that were statistically significant at the 0.10 level, nonstandardized regression coefficients and an indication of level of significance are shown. For variables not excluded in the first step which were excluded in the final regression, the letters "ns" (not signficiant) are shown in the body of the table together with the sign of the regression coefficient, shown in parentheses.

In the reading equation, at least one variable from each of the six groups of family characteristics was represented (in addition to the five dichotomous "student" variables). Using stepwise OLS (inclusion criterion 0.10), ten of the nineteen independent family variables were included in the final equation. Of these, five were either measures of time-use or parent-child interactions. Controlling for other factors, none of the original SES measures was retained in the final equation. Of the six original family structure measures, only preschoolers at home was significantly related to reading achievement. Of the six original measures of mother's characteristics, both educational level and occupational status were positively associated with reading performance. Neither work status in the current period (WWORK) nor labor supply during the preschool years (PREHOURS) appeared to influence reading scores. In the fourth category, parental expectations were strongly associated with reading level. Of the original seven time-use variables, only time spent in two activities was significantly associated with reading performance. Contrary to our initial expectations, time spent doing things with adults and time spent doing homework, were still both negatively associated with reading. Time spent watching television appeared to have no significant impact on reading achievement. Of the ten types of parent-child interactions initially considered (group 6), four were

statistically significant in the final model. Reading to a child on a daily basis during the preschool years (READPAST) and talking and joking together (VBLINT) were positively associated with reading achievement. Shopping together regularly and eating dinner together were negatively associated with reading achievement, holding other things constant.

In the MATH equation, as was the case with READ, variables from all six groups were available in the final model. Of the seven variables not excluded in the first step of analysis, six were retained in the final equation. Five of the six variables measured time-use or parent-child interactions. Controlling for grade, sex and parental expectations, once differences in time-use and activities were controlled for, differences in SES, parental education, and family structure had no apparent impact on math achievement! Both time-use variables retained in the final equation were negatively associated with math achievement. As with reading, time spent with adults had a negative association with achievement. In addition, television time also had a significantly negative impact on math achievement. Like reading achievement, math achievement was positively associated with daily preschool reading and negatively associated with eating together with adults. Finally, parental reports of regularly engaging in religious activities with their children were negatively associated with math achievement.

In the noncognitive areas, measures of out-of-school time-use and parent-child interactions did not contribute to explaining differences in outcomes. Of the 27 time and activity variables, only HOMEWORK was retained, and there in only one of the three noncognitive models. Very little of the observed variance in noncognitive outcomes could be explained by the family measures. This may have been due to the instruments themselves; each contained only ten items and none had been validated outside the school district.

Conclusions and Implications

Findings from this study must be considered in light of a number of substantial caveats. First, the sample is not typical of the general population. The school district in which data were collected was unique in that it provided parental choice among nontraditional alternatives. Families that selected such alternatives were oversampled. The families included were generally highly educated, high income and chose to live in a community with unusual public education options. The analysis has utilized the assumption of a linear additive achievement model for all five outcomes with no interactions among independent variables. Clearly, a logical next step in this research will be to test different functional forms of the model as well as to test for structural differences by characteristics such as child's sex, and mother's education.

Despite these limitations, the analysis does provide very strong support for the hypothesis that it is differences in what families do rather than family characteristics per se. that influence achievement in school. It is particularly interesting that in the reading equation, none of the original SES variables retain their significance once differences in time-use and parent-child interactions are controlled for. Even more striking is the math equation where none of the variables representing family SES, family structure or mother's characteristics enters the final regression equation.

While the analysis strongly suggests that behaviors and experiences, rather than characteristics affect learning, the nature of many of the time and activity impacts is unexpected. Aside from TV time (which has a negative coefficient) preschool reading (which is positive) and verbal interaction (which is also positive), many of the findings are counter-intuitive. Time spent interacting with adults is negative in both achievement equations. Time spent on homework appears to be negatively related to reading achievement. Perhaps more able students are faster workers. Perhaps most

perplexing of all, the fifteen percent of the students who do not eat with adults appear to do better on both achievement tests, ceteris paribus.

The analysis strongly suggests that additional work is warranted in this area and that the subject holds promise for contributing to our understanding of differences in school.

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Table 1

Outcome Scores by Grade and Sex

Group	Dependent Variables				
	READ	MATH	SELFCONC	ATTISCHL	LOCCONTR
Full Sample	84.09 (22.03) [610]	85.06 (22.99) [608]	5.50 (1.24) [337]	5.12 (1.94) [337]	4.21 (1.17) [337]
Grade 2	64.70 (12.02) [115]	61.13 (11.71) [115]	5.15 (1.97) [95]	5.07 (2.03) [95]	3.91 (1.06) [95]
Grade 3	75.73 (12.89)	74.81 (13.54)	5.34 (1.24)	5.09 (2.32)	4.15 (1.29)
Grade 4	80.97 (14.29) [120]	82.30 (11.62) [119]	5.37 (1.36) [41]	4.80 (2.33) [41]	4.32 (1.17) [41]
Grade 5	87.71 (12.05) [123]	93.25 (11.23) [123]	5.88 (0.95) [34]	4.97 (1.68) [34]	4.38 (1.26) [34]
Grade 6	107.11 (26.06) [136]	109.46 (25.34) [134]	5.77 (1.25) [120]	5.32 (1.60) [120]	4.40 (1.15) [120]
Male	83.44 (21.43) [310]	84.76 (23.28) [309]	5.46 (1.20) [171]	4.65 (2.04) [171]	4.14 (1.17) [171]
Female	84.35 (22.84) [282]	85.14 (22.-8) [280]	5.51 (1.27) [156]	5.65 (1.69) [156]	4.26 (1.19) [156]

Note: Standard deviations in parentheses, cell sizes in brackets

Table 2
Socioeconomic Status and School Outcomes Regressions

Independent Variables		Dependent Variables				
Variable	Mean/(SD)	READ	MATH	SELFCONC	ATTISCHL	LOCCONTR
Group						
GRADE				.18 ***	+	.13 **
G2 - excluded						
G3		17.82 ***	20.79 ***			
G4		23.56 ***	29.15 ***			
G5		31.85 ***	42.38 ***			
G6		44.79 ***	50.45 ***			
FEMALE		2.66 *	+	+	.98 ***	+
Socioeconomic Status						
FAMINC	33,835 (15,210)	+	+	+	+	+
HDEDUC	15.60 (2.16)	1.12 **	1.24 ***	+	+	+
HDOCC	7.21 (1.63)	1.48 **	+	+	+	+
HDWAGE	15.18 (8.40)	+	+	-	-	+
N		392	391	213	213	213
Adj R^2		.53	.62	.04	.06	.03

Note: Significance levels (*** ≤ .01), (** ≤ .05), (* ≤ .10)

Table 3

Family Structure and School Outcomes Regressions

Independent Variables		Dependent Variables				
Variable	Mean/(SD)	READ	MATH	SELFCONC	ATTISCHL	LOCCONTR
Group				.179 ***	+	.133 ***
GRADE						
G2 - excluded						
G3		17.94 ***	21.31 ***			
G4		24.67 ***	30.29 ***			
G5		32.82 ***	43.12 ***			
G6		45.82 ***	51.56 ***			
FEMALE		2.73 **	2.19 *	+	.98 ***	+
Family Structure						
NCHILDREN	2.88 (1.32)	-	-	-	+	+
NPRESCHOOL	0.32 (0.56)	4.19 ***	2.74 **	+	+	-
NINSCHOOL	2.41 (1.20)	-	-	-	+	+
NO FATHER	0.09 (0.29)	-3.70 *	-	-	-.73 **	-
JEWISH	0.31 (0.46)	3.71 **	3.63 ***	+	+	+
CATHOLIC	0.38 (0.49)	-4.71 ***	-	-	-.44 **	-
N		589	586	326	326	326
Adj R^2		.53	.62	.04	.08	.03

Note: Significance levels (*** ≤ .01), (** ≤ .05), (* ≤ .10)

Table 4

Mothers' Characteristics and School Outcome Regressions

Independent Variables		Dependent Variables				
Variable	Mean/(SD)	READ	MATH	SELFCONC	ATTISCHL	LOCCONTR
Group						
GRADE				.18 ***	+	.141 ***
G2 - excluded						
G3		18.77 ***	21.33 ***			
G4		23.30 ***	29.03 ***			
G5		32.99 ***	42.71 ***			
G6		45.46 ***	50.67 ***			
FEMALE		2.86 **	2.43 *	+	.96 ***	+
Mothers' Characteristics						
WFEDUC	14.88 (2.10)	2.31 ***	1.80 ***	+	+	.108 ***
WFOCC	5.51 (2.76)	.85 ***	+	+	-	-
WFTEACH	.18 (.39)	-	+	-	-	+
WFWAGE	7.44 (6.54)	+	+	+	.035 *	+
WWORK	.42 (.49)	-2.52 *	+	+	+	+
PREHOURS (thousands)	.803 (2.18)	+	-	-	-.107 *	-.0716 *
N		406	401	231	231	231
Adj R^2		.57	.64	.04	.08	.07

Note: Significance levels (*** ≤ .01), (** ≤ .05), (* ≤ .10)

Table 5

Parental Expectations and School Outcomes Regressions

Independent Variables		Dependent Variables				
Variable	Mean/(SD)	READ	MATH	SELFCONC	ATTISCHL	LOCCONTR
Group						
GRADE				.18 ***	+	.133 ***
G2 - excluded						
G3		17.74 ***	20.86 ***			
G4		23.34 ***	29.21 ***			
G5		32.84 ***	43.15 ***			
G6		44.75 ***	50.73 ***			
FEMALE		4.12 ***	3.33 ***	+	1.03 ***	+
Attitudes & Expectations						
CEDEXP	16.025 (1.20)	4.88 ***	3.81 ***	.096 *	.161 *	+
CEDASP	16.036 (0.97)	+	+	+	-	+
N		589	586	326	326	326
Adj R^2		.57	.65	.05	.07	.03

Note: Significance levels (*** ≤ .01), (** ≤ .05), (* ≤ .10)

Table 6

Time Use After School and School Outcomes Regressions

Independent Variables		Dependent Variables				
Variable	Mean/(SD)	READ	MATH	SELFCONC	ATTISCHL	LOCCONTR
Group						
GRADE				.179 ***	+	+
G2 - excluded						
G3		18.13 ***	21.39 ***			
G4		25.01 ***	29.91 ***			
G5		33.26 ***	42.26 ***			
G6		46.66 ***	50.52 ***			
FEMALE		+	+	+	.98 ***	+
Time Use						
TV	1.33 (.74)	-2.80 ***	-2.96 ***	-	-	+
ADULTS	1.23 (.73)	-2.13 **	-2.50 ***	-	+	-
ALONE	0.74 (.63)	2.75 **	1.83 **	-	+	-
CHILDREN	2.29 (.86)	-	+	+	+	-
HOMEWORK	0.63 (.58)	-3.56 **	-	-	+	.482 ***
ORG ACTV	0.24 (.65)	-	-	-	-	+
CHORES	0.03 (.17)	+	-	-	-	+
N		442	442	243	243	243
Adj R^2		.52	.62	.04	.06	.05

Notes: Significance levels (*** ≤ .01), (** ≤ .05), (* ≤ .10)

Table 7

Parent-Child Interactions and School Outcomes Regressions

Independent Variables		Dependent Variables				
Variable	Mean/(SD)	READ	MATH	SELFCONC	ATTISCHL	LOCCONTR
Group						
GRADE				.18 ***	+	.13 ***
G2 - excluded						
G3		17.07 ***	20.37 ***			
G4		23.19 ***	29.56 ***			
G5		30.80 ***	42.48 ***			
G6		42.65 ***	50.52 ***			
FEMALE		2.89 **	+	+	1.03 ***	+
Activities						
READPAST	.54 (.50)	7.39 ***	4.96 ***	+	-	+
EATWITH	.86 (.35)	-4.93 ***	-6.64 ***	-	-	-
READNOW	.67 (.47)	-	-	+	+	-
GAMES	.59 (.49)	-3.42 ***	-	+	+	-
CHORES	.87 (.34)	+	-	+	.60 *	+
SHOP	.71 (.45)	-4.29 ***	-	-	-.49 **	-
RECREA	.80 (.40)	+	-	+	+	-
RELIGN	.08 (.27)	-	-4.00 *	-	-	-
MUSART	.10 (.29)	-	-	+	+	+
VBLINT	.16 (.37)	5.19 ***	+	-	-	+
N		589	563	326	326	326
Adj R^2		.55	.63	.04	.07	.03

Note: Significance levels (*** ≤ .01), (** ≤ .05), (* ≤ .10)

Table 8

Final Regression Models

Independ. Vars.	Dependent Variables READ	MATH	SELFCONC	ATTISCHL	LOCCONTR
Student					
GRADE	-- ***	--- ***	.18 ***	---	ns (+)
G3	18.50 ***	20.93 ***	---	---	---
G4	22.47 ***	29.50 ***	---	---	---
G5	35.34 ***	48.33 ***	---	---	---
G6	48.33 ***	51.63 **	---	--- ***	---
FEMALE	4.42	2.59	ns (+)	0.96	---
SES					
HDEDUC	ns (-)	ns (-)	---	---	---
HDOCC	ns (+)	---	---	---	---
Family Structure					
NPRESCHOOL	3.39 ***	ns (+)	---	---	---
NO FATHER	ns (-)	---	---	ns (-)	---
JEWISH	ns (+)	ns (-)	---	---	---
CATHOLIC	ns (-)	---	---	ns (-)	---
Mother					
WFEDUC	.82 *	ns (+)	---	---	.12 ***
WFOCC	.68 ***	---	---	---	---
WFWAGE	---	---	---	.04 *	---
WWORK	ns (-)	---	---	---	---
PREHOURS (000's)	---	---	---	-.107 *	-.076 **
Expectations					
CEDEXP	3.31 ***	3.37 ***	.10 *	ns (+)	---
Time Use					
TV	ns (-) *	-2.22 **	---	---	---
ADULTS	-1.72	-2.42 ***	---	---	---
ALONE	ns (+) **	ns (+)	---	---	---
HOMEWORK	-3.22	---	---	---	.55 ***
Parent-Child Interaction					
READPAST	3.05 **	2.57 *	---	---	---
EATWITH	-3.21 *	-6.20 ***	---	---	---
GAMES	ns (-)	---	---	---	---
CHORES	---	---	---	ns (+)	---
SHOP	-3.58 ***	---	---	ns (-)	---
RELIGN	---	-4.65 **	---	---	---
VBLINT	4.84 ***	---	---	---	---
# of possible family vars	19	11	1	7	3
N	443	442	226	231	243
R^2	.62	.68	.05	.08	.11

Notes: Dashes '---' indicate that the variable was excluded from the model based on the first step of analysis. The letters 'ns' indicate that the variable did not meet the inclussion criteria of .10.